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## Role of acute pain service in optimizing postoperative pain relief in a tertiary care teaching hospital

Aliya Ahmed, Muhammad Yasir

### Abstract

**Objective:** To assess the frequency and types of adjustments that acute pain service makes to postoperative analgesic regimes to improve pain relief or treat side effects.

**Methods:** The prospective observational study was conducted at the Aga Khan University Hospital, Karachi, from December 1, 2012, to March 31, 2013. Data was collected from Acute Pain Service register four hours after the pain rounds by a Service member not involved in rounds. Data was collected on a standardised form and analysed using SPSS 19.

**Results:** Of the 323 patients, 209(65%) were receiving epidural infusions and 114(35%) were receiving intravenous patient-controlled analgesia. Overall, 114(35%) required action by Acute Pain Service; 76(66.6%) with epidural infusions and 38(33.3%) intravenous analgesia. Besides, 98(85.9%) had inadequate pain relief, 61(62%) with epidural and 37(38%) with analgesia. Post-intervention, motor block occurred in 13(11.4%) patients, who were managed by change of patient's position and/or lowering the concentration of epidural solution. Improvement was seen in all patients after the adjustments.

**Conclusion:** Acute Pain Service played an important role in improving the quality of postoperative pain relief and management of analgesia-related side effects. Regular feedback to the primary anaesthesiologist can lead to improved practices.

**Keywords:** Pain management, Postoperative pain, Acute pain service. (JPMA 65: 1164; 2015)

### Introduction

Postoperative pain is often the patient's utmost fear at the time of surgery. Provision of effective and safe postoperative pain management should be one of the top priorities of any healthcare centre where surgical procedures are carried out. Considerable advancement has been achieved in recent years in the understanding and management of pain. However, evidence shows that postoperative pain management is often sub-optimal.<sup>1-3</sup> Effective postoperative pain management improves patient comfort and level of satisfaction, helps in better physiotherapy and earlier rehabilitation, and has the potential to improve postoperative outcome.<sup>4</sup> Attempts to improve postoperative pain management have led to the formation of acute pain services (APS). To ensure good practice and patient satisfaction, APS must be dedicated to safe and effective delivery of pain relief with an evidence-based practice.<sup>5</sup>

A very important responsibility of the APS team is to conduct regular studies and audits of the quality of pain relief provided and give feedback to the department faculty and trainees. This is essential for identifying

limitations and making strategies to improve pain management and implementing them. Keeping in mind this important responsibility of APS, the current study was planned to assess the frequency and type of adjustments that the APS has to make to the analgesic regimes prescribed by the primary anaesthesiologists in order to improve pain relief. The secondary objective was to assess the frequency of steps required by APS to treat side effects. The overall aim was to determine the role of APS in optimising acute postoperative pain management at our tertiary care university hospital.

### Patients and Methods

The prospective observational study was conducted at the Aga Khan University Hospital (AKUH), Karachi, from December 1, 2012, to March 31, 2013. The primary anaesthesiologist providing intraoperative anaesthetic management to a patient is responsible for prescribing the postoperative analgesic regime at AKUH. The APS team, consisting of on-duty pain nurse, rotating Resident and consultant anaesthesiologist, follows up patients receiving epidural infusions, intravenous patient-controlled analgesia (IV-PCA) or intravenous opioid infusions, with daily morning and evening rounds, or more often if indicated, to ensure the effectiveness and safety of the pain management regimes employed. To achieve optimum pain relief, the team often needs to

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make adjustments to the originally prescribed strategies and may also need to treat side effects.

An 11-point verbal numeric rating scale (VNRS) of 0 to 10 is used for pain assessment, where 0 means no pain and 10 is equivalent to worst possible pain. Assessment is also made to assess side effects of the prescribed analgesics and management is provided accordingly. Motor block is assessed by using the modified Bromage scale of 0 to 3 (0 = no motor block; 1 = unable to raise straight leg, but able to bend knee and move ankle; 2 = unable to bend knee but able to move ankle and toes; 3 = unable to move the lower limb). Nausea/vomiting is assessed by using a 4-point verbal descriptive scale<sup>6</sup> whereby 0 means no nausea or vomiting, 1 means mild nausea, 2 stands for moderate nausea requiring treatment, and 3 means severe nausea/ vomiting. Sedation is assessed by a four-point scale, where 0 means fully awake; 1 stands for slightly drowsy, easily arousable; 2 means frequently drowsy, drifting off to sleep during conversation; and 3 stands for deep sleep/difficult to rouse. This scale is a modified form of the one described in literature regarding IV-PCA.<sup>7</sup> Respiratory rate, blood pressure and heart rate are regularly assessed by the nursing staff on all patients receiving epidural infusions and IV opioids. The adjustments made by APS usually include epidural boluses, addition of co-analgesics, withholding of epidural, administration of antiemetics, change of PCA settings, etc., depending upon patient's pain scores and presence of side effects.

In the current study, all adult patients receiving continuous epidural infusion or IV-PCA for postoperative pain relief and being followed up by APS were included. Postoperative patients receiving intermittent opioids or non-opioid analgesics alone were excluded. One of the authors, not involved in the acute pain rounds for that day, collected data four hours after the rounds from the notes in the APS register maintained in the department. The APS register is kept in the post-anaesthesia care unit (PACU) of the main operating room suite and initial patient information along with information of the prescribed analgesic regime is filled in relevant columns by the primary anaesthesiologist at the time of arrival of the patient in PACU. The APS team then follows up all patients entered in the register and is responsible for updating the information in the register after their rounds, including pain scores, presence of side effects and steps taken to improve pain relief or treat side effects until the patient is discharged from the service.

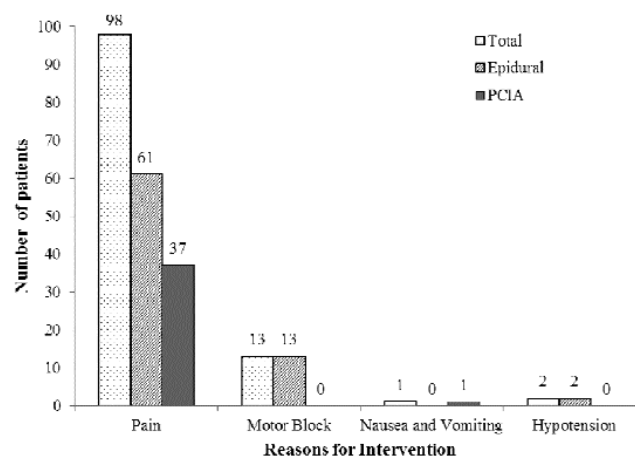
The study protocol was approved by the Department Research Committee. As the entire data was collected from APS register and patients were not identified or

directly approached for data collection or their file notes accessed at any time, no ethical issue was identified by the committee. Data was collected on a standardised form which included information about main analgesic strategy, drugs being administered, co-analgesics and antiemetics prescribed. Patients' pain score, sedation score, postoperative nausea and vomiting (PONV) and lower limb motor weakness was entered as assessed during the pain round in addition to physiological variables, including blood pressure, heart rate and respiratory rate. Data was also collected on the adjustments/changes made to the original analgesic prescription by the APS members to improve pain relief and the treatment prescribed by them to manage side effects. The effectiveness of the adjustments made was also noted from the follow-up notes in the register. To maintain confidentiality, patients were numbered consecutively for data collection and patients' names or medical record numbers were not recorded in the data collection form.

All statistical analyses were performed using SPSS 19. Frequencies and percentages were computed for categorical variables, including changes made to the prescribed regime by APS team, and side effects treated.

## Results

Of the 323 patients whose records were reviewed, 209(64.7%) were receiving epidural infusion of 0.1% bupivacaine with fentanyl 2 µg/ml, while 114(35.3%) received IV-PCA with morphine. All patients were also receiving paracetamol as co-analgesic and metoclopramide as antiemetic. Overall, 114(35.3%) patients required adjustments to the initially prescribed analgesic regimes by APS due to ineffective analgesia or



**Figure:** Patients requiring adjustments to prescribed analgesia / management of side effects by the acute pain service.

presence of side effects (Figure). Of the 114 such patients, 76(66.6%) were receiving epidural infusion and 38(33.3%) had been prescribed IV-PCA. Further, 98(85.9%) patients had inadequate pain relief; 61(62%) receiving epidural infusion, and 37(38%) with IV-PCA. Action was taken by APS if pain scores were found to be 3 or more on VNRS of 0 to 10. The initial action taken to relieve pain in patients receiving epidural infusion was bolus of ongoing epidural infusion. Bolus alone was adequate for 42(66%) of the 61 patients, while 19(34%) patients required bolus of ongoing infusion, increase in infusion rate plus addition of another analgesic, either ketorolac or tramadol. In patients receiving IV-PCA, 19(51%) received bolus of the PCA drug and change of PCA settings, while 18(49%) required regular administration of IV ketorolac in addition to the above measures. Improvement in pain scores was seen in all (100%) patients one hour after these adjustments.

Post-intervention, motor block occurred in 13(11.4%) patients, who were managed by change of patient's position and/or lowering the concentration of epidural solution. The issue was thus resolved in 11(84.6%), while just change in patient's position towards the side opposite to the block worked for 2(15.4%). Hypotension occurred in 2(2.6%) patients with epidural infusion. It responded to conventional management in 1(50%) patient, while the epidural had to be discontinued in the other due to refractory hypotension. One (2.6%) patient receiving IV-PCA required ondansetron due to nausea and vomiting. Improvement was seen in all patients after the steps taken by APS. None of the patients required management for sedation or respiratory depression.

## Discussion

This prospective observational study was conducted to determine the frequency with which the APS needed to make adjustments to the prescribed analgesic strategies in order to improve the quality of postoperative pain relief or to treat analgesia related side effects. Literature search was conducted to find a benchmark against which to conduct an audit regarding this aspect of the role of APS, but none was retrievable. Therefore this study was planned.

In this study, 35.3% of the followed-up patients required management adjustments by APS; 85.9% of which were for inadequate pain relief. Thus, inadequate pain relief amounted to 30% of the total patients studied. Moderate to severe pain requiring further treatment was reported by 29% of patients receiving epidural analgesia and 32.4% of those who were prescribed IV-PCA. Despite considerable improvement in the knowledge of

physiology and pharmacology of pain, evidence shows that this knowledge has not translated into a similar degree of improvement in pain management and a considerable number of surgical patients still suffer due to inadequately relieved pain.<sup>8-10</sup> An overall review of postoperative pain after major surgery has indicated that more than 20-25% patients experience moderate to severe pain after surgery despite the use of pain management strategies.<sup>11</sup> Since inadequate pain relief in 30% means that a considerable number of patients remained in pain postoperatively, we looked at findings of other researchers in this respect and found that they also found a high prevalence of unrelieved pain in the postoperative period. A lone study<sup>12</sup> reported that moderate to severe pain was found in 41% patients on Day 0 and in 30% on postoperative Day 1, with highest prevalence after abdominal, extremity and spine surgery. It concluded that despite acute pain management protocols, prevalence of moderate to severe pain was high. On detailed review of literature, one analysis<sup>13</sup> found that unrelieved pain was seen in 41-69% patients. It suggested that formulation and implementation of clinical pathways could improve quality of postoperative pain relief and decrease the number of patients suffering from moderate to severe pain.

Effective postoperative pain management is essential for improving surgical outcome and patient satisfaction.<sup>4</sup> Better pain control has been shown to lead to faster mobilisation, earlier enteral feeding and shorter hospital stay.<sup>14</sup> We used a pain score of 3 as the cut-off point for giving additional analgesics following the observation made by an earlier study<sup>15</sup> that reducing pain levels to "no worse than mild pain" has health and economic benefits for patients, including improved sleep, less depression, etc. According to the authors, "any outcome worse than mild pain should be unacceptable and should be regarded as a mark of analgesic failure". Another study<sup>16</sup> observed that request for additional analgesics was made by patients with visual analogue scores more than 30 (equivalent to 3 on VNRS); the requests being much less in patients with scores less than 30. Effective acute pain management may be helpful in reducing the development of chronic pain syndromes,<sup>17</sup> although more research is required to establish this. Some of the deficiencies identified in postoperative pain management include healthcare professionals' education, patient information, evaluation of pain, etc.<sup>8</sup> APS can play a key role in resolving these deficiencies by timely managing patients' pain and actively participating in patients' and healthcare professionals' education.

It is encouraging to see that epidural analgesia is

commonly used at our institution after major abdominal and orthopaedic joint replacement surgery (209/323). Informal and formal discussions at national conferences and pain symposia have revealed that epidural services are available in very few hospitals in our country, due not only to considerable deficiency of trained nursing staff, but also to lack of expertise. Epidurals are well recognised for providing high quality of pain relief<sup>18</sup> and facilitating postoperative recovery.<sup>19</sup> It is also evident from the results that multimodal analgesia is a routine practice at our hospital. Multimodal analgesia was introduced to improve pain relief while avoiding opioid-related adverse events, and is part of current recommendations for best analgesic practice.<sup>20</sup> However, despite the frequent use of epidural technique, IV-PCA and multimodal analgesia, adjustments were required by APS in a considerable number of patients to improve pain relief. Improvement in pain scores was seen in all patients one hour after the APS interventions. This shows that if adequate follow-up with regular pain assessment is not performed, even the most high-tech strategies might fail to provide the desired results. It has been rightly stated that it is important to differentiate between the advantages of the analgesic techniques themselves and those achieved by the increased specialist supervision and education provided by dedicated members of APS.<sup>21</sup>

The most common side effect requiring management by APS was motor block in patients receiving epidural infusions, which was resolved in all patients by either decreasing the concentration of local anaesthetic or changing patient's position. Lower limb motor weakness caused by epidural analgesia delays patient's mobilisation and rehabilitation and must be addressed as soon as it is discovered.<sup>22</sup> The steps taken by APS resolved the motor block in all patients, thus enabling timely initiation of postoperative rehabilitation protocols. Hypotension was seen in two patients and vomiting in one, which was successfully managed by APS.

These results provide information on the role of APS in improving the overall effectiveness and safety of postoperative pain management and will guide us in making strategies for further improving the service. The adjustments/changes required repeatedly have been communicated to members of the department in the departmental meetings. The feedback provided is expected to guide the consultant anaesthesiologists to re-think their postoperative analgesic practices rather than continuing their preferred strategies believing that their prescribed techniques are achieving optimum pain relief without significant side effects.

Despite the limitation of a short four-month duration, we

believe that the data collected in this study would be useful in planning and conducting similar larger studies in future. This data, by identifying the strategies that require repeated adjustments by APS, will be useful when making institutional guidelines and recommendations for effective postoperative pain management practices. The data would also guide us in identifying areas for teaching and training of surgical ward staff so as to enable them to handle inadequate analgesia and manage analgesia-related side effects.

## Conclusion

Our study shows that APS plays a significant role in improving the quality of postoperative pain relief and in prevention and management of analgesia-related side effects, both of which are important in improving patient safety and satisfaction. Regular feedback provided by APS to the primary anaesthesiologist can lead to better postoperative pain management practices. It is high time that the importance of formal acute pain services was recognised in developing countries and initiatives were taken to establish such services in all major healthcare centres.

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**Conflict of interest:** None to be declared

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